REMARKS

Claims 1-14 are presently pending in the application. Claims 12-14 are currently withdrawn from consideration in view of an election of species requirement.

The Examiner has objected to the drawings on the grounds that the drawings failed to show the generally flattened, two-dimensional shape of the strip conductors or conductive tracks and also the paste by which the temperature sensor is mounted on the tube. Actually, the strip conductors or conductive tracks are shown in present Fig. 3 by the two black marks under the sensor 2 against the outer wall of the carrier body 52. Nevertheless, in order to more clearly show the strip conductors or conductive tracks, proposed new Figs. 1c and 1d are presented herewith for approval by the Examiner. Fig. 1d also shows the conducting paste for mounting of the temperature sensor on the strip conductors or conductive tracks. Corresponding paragraphs have been added to the Brief Description of the Drawings at page 3 and to the Detailed Description of the Invention at page 4 of the specification to describe these new figures. No new matters has been added, and entry of the drawings and specification amendments and withdrawal of the drawings objection are respectfully requested.

The Examiner has also objected to the specification, requiring that the specification clearly show that the term conductive track is an alternative term for conductor strip, as explained in Applicant's Remarks in response to the previous Office Action. Accordingly, paragraph 0007 (the first place where the term "strip conductors" appears in the specification) has been amended to introduce this alternative term. No new matter has been added, and entry of the Amendment and withdrawal of the objection to the specification are respectfully requested.

The Examiner has rejected claims 1-4, 6 and 11 under 35 U.S.C. § 103(a) as being unpatentable over British Patent Specification 979,616 of Honeywell in view of U.S. Patent 5,037,488 of Wienand and U.S. Patent 6,077,228 of Schonberger. The Examiner applies Honeywell in the same manner as in the previous Office Action. The Examiner concedes that Honeywell fails to disclose the sensor being mounted on conductive tracks on the outer side of the tube using a thermally and electrically good-conducting paste.

However, the Examiner contends that Wienand teaches that the use of conductive tracks 2, 3 for coupling a temperature sensor 11 is well-known in the art, and that the arrangement of Wienand allows for a flexible structure which is less likely to resonate under the influence of vibrations. The Examiner further contends that Schonberger teaches the use of a thermally and conductive epoxy 62 to hold and electrically connect a temperature sensor to a conductor.

The Examiner concludes that it would have been obvious to one skilled in the art to replace the temperature sensor configuration of Honeywell for a temperature sensor mounted on conductive tracks on the outer side of the tube, as taught by Wienand, and further using a thermally and electrically conductive paste to couple the sensor to the conductive tracks, as taught by Schonberger, since the resulting temperature sensor configuration will perform the same function of generating a signal representative of the measured temperature while providing a stronger mounting arrangement that is less likely to be affected by vibrations.

This rejection, as well as the rejections of the remaining claims based upon the same combination with additional references, is respectfully but strenuously traversed for the reasons set forth in detail below.

Contrary to the Examiner's contentions, none of the prior art references relied upon in this combination rejection teaches a thermally and electrically good-conducting paste for mounting a temperature sensor on conductive tracks. In fact, none of the three references teaches or suggests an arrangement for thermally connecting a temperature sensor through a series of elements from a flowing environment whose temperature is to be measured through a wall to the sensor which is measuring the temperature. Instead, the device in each of the references relies at least in part on electrical conduction, instead of thermal conduction.

First, in the case of Honeywell, the thermocouple wire 27 is insulated from the outer wall of the tubular portion 26 by an insulating material 32 such as TEFLON. The only connection of the thermocouple 32 to the tubular portion is the soldering of the leads 28, 30 at points 34 and 35 to form a hot junction (see page 2, lines 20-29). Hence, the temperature is sensed at the hot junction 34, 35 and then conveyed electrically through the thermocouple wire, whereby the meter 54 measures the e.m.f. or current flow through the thermocouple wire (see page 2, lines 112-119). Hence, the only thermal conduction in this embodiment of Honeywell is from the inside of the tube through the tube wall to the hot junction 34, 35. The leads 28, 30 of the

thermocouple provide only an electrical connection between the sensed temperature at the hot junction 34, 35 and the meter 54.

Second, the construction of Wienand also provides only an electrical connection from the sensor 11 through leads 9, 10, through conductive tracks 2, 3, to the contacts 6, 6', 7, 7' at the opposite end for signal transmission to the connecting leads 12, 12', 13, 13' for the signal transmission pick up (unlabeled) at the opposite (right hand) end of the tube from the thermo-sensor 11 (see column 2, lines 56-61 and column 3, lines 32-40). There is no indication in Wienand that this series of connections is anything but an electrical connection between the sensor 11 and the signal transmission pick up. Moreover, the Examiner's argument that the conductive track arrangement of Wienand allows for a flexible structure which is less likely to resonate under the influence of vibrations is misplaced, since the flexible structure is not due to the conductive tracks, but rather to the springy carrier for the tracks which has a bowed orientation for mounting under spring tension on the inner surface of the protective tube (see col. 2, lines 17-26). Further, since the conductive tracks are on the inside of the carrier 1 (see Fig. 2), which is made of a non-conductive plastic material, such as used in standard printed circuit boards, there is no thermal conduction of the temperature from the tube wall 8 to the conductive tracks through the plastic carrier 1. The sole function of the conductive tracks 2, 3 mounted on the plastic carrier 1 is to provide signal transmission conductors which run through the tube practically oscillation-free, so that destruction of the conductors and/or erroneous measurement results are avoided (see col. 1, line 62 – col. 2, line 11).

Third, Schonberger is silent regarding any thermal conductivity of the layer 62 of epoxy as shown in Fig. 3. Contrary to the Examiner's contention, Schonberger only teaches that the layer 62 is electrically conductive and adhesive, for holding and electrically connecting the thermistors 30, 31, 32 to the conductors 41-46 (see col. 5, lines 5-10 and 28-32).

Accordingly, even if the three prior art references relied upon by the Examiner were properly combinable, which Applicant's do not agree, the combination still fails to teach all of the elements of the presently claimed invention. Moreover, the Examiner has not explained how the apparatus of Honeywell would be modified to mount the temperature sensor on conductive tracks on the outer side of the tube, as allegedly taught by Wienand. Thus, as noted above, Wienand does not mount the temperature sensor 11 on conductive tracks 2 and 3, but merely

electrically connects the sensor 11 to the tracks in an axial manner by leads 9, 10. Further, conductive tracks 2, 3 are mounted on the inside of the tubular plastic carrier (circuit board 1), as shown in Fig. 2. Still further, the temperature sensor construction of Wienand is generally of the type which the present invention is attempting to avoid, namely for use in an environment where the environment whose temperature to be measured is directly exposed to the temperature sensor (see open ended tube 8 in Fig. 2). In contrast, the present invention positions the temperature sensor outside the tube carrying the environment whose temperature is to be measured.

Hence, not only is the temperature sensor construction of Wienand non-analogous to that of the present invention, it is actually directed to a different environment, and the conductive tracks are mounted and used in a different manner. The invention of Schonberger is even further removed from the present invention, in that it involves a temperature scanner which is applied to the skin of a human in order to sense temperature differences at various areas of the skin. It is not directed to measuring the temperature of a fluid flowing in a tube; it does not have a temperature sensor securely attached to an outer side of a central tube section; and unlike Wienand, it is not concerned with the problem of avoiding machine vibrations and resonance oscillations. Accordingly, the three references are taken from three quite different arts and are unlikely to provide relevant teachings to the skilled person looking for solutions to the problem to which the present invention is directed.

The Examiner has also rejected claim 5 under 35 U.S.C. § 103(a) as being unpatentable over Honeywell in view of Wienand and Schonberger as applied above and further in view of U.S. Patent 4,520,661 of Tamai, and has rejected claim 7-10 under 35 U.S.C. § 103(a) as being unpatentable over Honeywell in view of Wienand and Schonberger as applied above, and further in view of U.S. Patent 5,980,102 of Stulen et al. Tamai and Stulen have already been discussed in connection with the similar rejections in response to the prior Office Action, and those remarks are incorporated herein by reference. In any event, neither Tamai nor Stulen makes up for any of the deficiencies of the combination of Honeywell, Wienand and Schonberger, as discussed above. Accordingly, reconsideration and withdrawal of these rejections also are respectfully requested.

In view of the above amendments, it is submitted that the specification and drawings are now in good form and non-objectionable. Further, in view of the above remarks, it is submitted

that all of the claims in the application patentably distinguish over the prior art of record. Reconsideration of the objections and rejections and an early Notice of Allowance are respectfully solicited.

Respectfully submitted,

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(Date)

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WWS:rc
Enclosure: One sheet of formal drawings – Figs. 1c and 1d